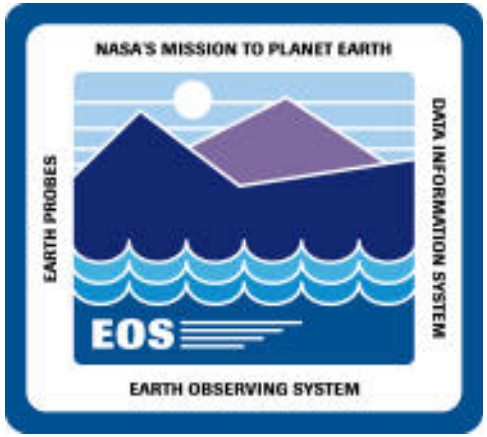
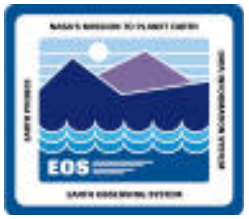


Road to CDR

Ed Lerner

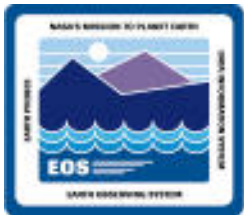
2 November 1995

The Road



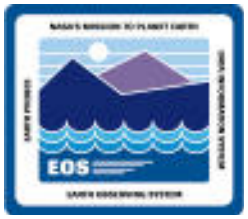
- Detailed design objectives and approach
- SLOC and feasibility
- The incremental track
- Metrics
- Cross-release coordination

Release B Detailed Design Objectives



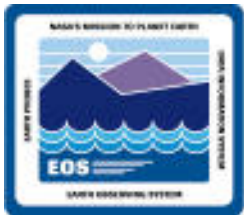
- **Ensure ECS Release B meets all its Level 4 requirements**
- **Reuse as much of Release A as practical**
- **Enhance architectural infrastructure; promote reusability**
- **Provide scalability and evolvability**
- **Refine system design via user community and DAAC feedback**
- **Complete selection of hardware and software COTS**

Release Ir1/A Reuse in Release B



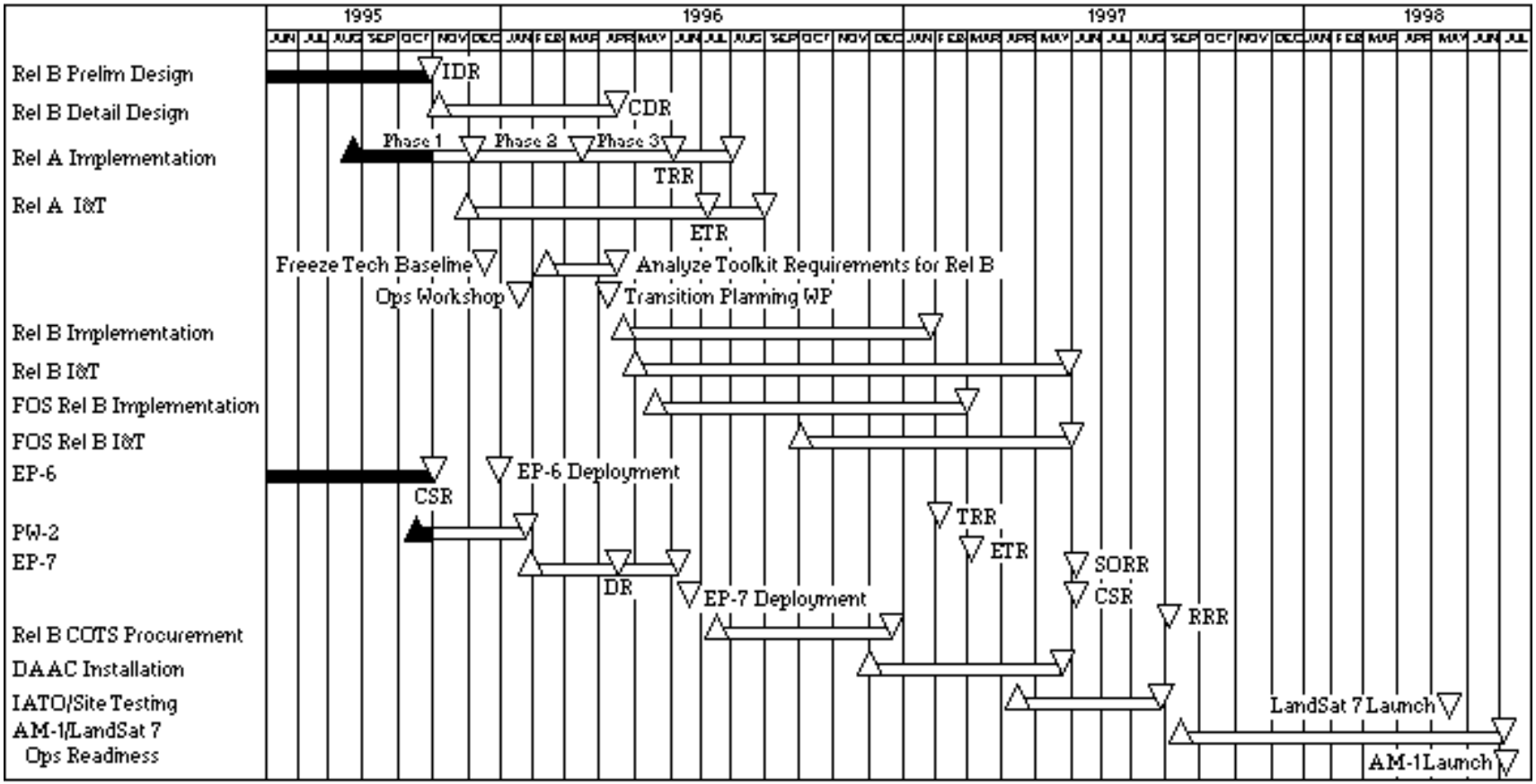
- Design
- Code
- COTS procurements and integration
- Deployed hardware
- Engineering processes
- Development infrastructure
- Operational scenarios and procedures
- Trained personnel
- Lessons learned

Detailed Design Approach

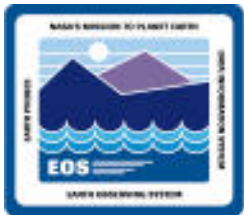


- **Continue to be scenario driven**
- **Continue design issue team (DIT) mechanism**
- **Continue to incorporate feedback from Ops workshop, prototypes, and telecons**
- **Incorporate Release A modifications via CM-controlled process**
  - **Formal configuration control process in place**
  - **Custom OMT scripts to identify design changes**
  - **CCB approval required for changes to public interfaces**
  - **Release B will resynch with Release A at end of each Release A phase**
- **Perform requirements trace to Release B design objects**
- **Completion of detailed design in light of COTS selections**

Proposed Release B Implementation Schedule



Validation of non-SLOC Detailed Design Effort



- Most Release A COTS selections carry forward to Release B
- Release B has far fewer COTS selections to make than Release A
- New Release B COTS HW has been aggressively prototyped and studied

New glue code in Release B is easier to estimate/design due to pre-selection of COTS

COTS Procurements by Release

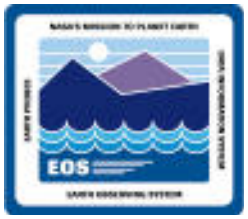
Ir1	27/27
A	19/20
B	4/13

Key: procurements completed/ total procurements expected

Release B—New Custom SLOC

CI	Rel B @ RIR	Rel B @ IDR	Delta
CIDM			
Desktop (DESKT)	3,200	1,000	-2,200
Workbench (WKBCH)	31,800	38,500	6,700
Advertising Service (ADSRV)	2,000	2,000	0,000
Local Information Manager (LIMGR)	5,000	12,000	7,000
Distributed Information Manager (DIMGR)	8,700	8,700	0,000
Data Dictionary (DDICT)	4,000	7,700	3,700
V0 Interoperability Gateway (GTWAY)	3,000	2,000	-1,000
Data Server			
Science Data Server (SDSRV)	44,700	46,500	1,800
Document Data Server (DDSRV)	4,000	4,000	0,000
Storage Mgmt (STMGT)	2,500	2,500	0,000
Data Distribution (DDIST)	8,000	8,000	0,000
Ingest			0,000
Ingest (INGST)	9,000	9,600	0,600
PDPS			
Production Planning (PLANG)	8,950	14,650	5,700
Processing (PRONG)	13,650	19,900	6,250
Algorithm I&T (AITTL)	4,900	4,900	0,000
CSS			
Distributed Computing Software CI (DCCI)	47,000	27,300	-19,700
MSS			
Management Logistics (MLCI)	9,000	9,000	0,000
Management Agent (MACI)	1,000	1,000	0,000
Management Software (MCI)	20,000	24,300	4,300
TOTALS:	230,400	243,550	13,150

Major SLOC Changes Since RIR



Mode Management ↑

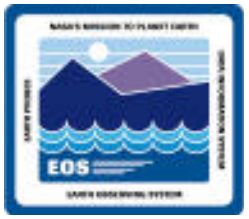
Trader Deferred (Evolutionary Enhancement) ↓

Retrofit B Improvements to A ↑

Subsystem-Specific Enhancements ↑

Refinement of Estimates ↑↓

Detailed Design Feasibility Validation—Custom Code

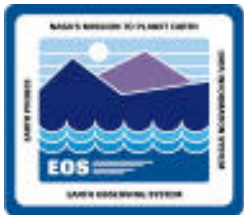


REVIC MODEL INPUTS for	REL B @ IDR	REVIC EDSI (TOTAL REUSE)	EQUIVALENT CODE COUNT	CRITICAL DESIGN SCHEDULE DURATION	NOTES
Incremental					
CLS (DESKT)	1,000	110 (2,200)	1,110	1.6	
CLS (WKBCH - Search Tools)	16,500	0	16,500	4.5	(30% done)
CLS (WKBCH - Tools)	22,000	200 (4,000)	22,200	5.0	(15% done)
IOS (ADSRV)	2,000	625 (12,500)	2,625	2.2	
DMS (LIMGR, DIMGR)	20,700	0	20,700	4.9	(25% done)
DMS (DDICT, GTWAY)	9,700	776 (15,550)	10,478	3.8	
Formal					
DSS (SDSRV - Rel A Retrofit)	10,500	850 (17,000)	11,350	3.9	
DSS (SDSRV - Rel B New Products)	16,000	859 (17,175)	16,859	4.5	(Note 1)
DSS (SDSRV - Rel B New Generic Services)	20,000	0	20,000	4.9	(Note 1)
DSS (DDSRV, STMGT, DDIST)	14,500	1,175 (23,500)	15,675	4.4	(Note 1)
INS	9,600	1,298 (25,950)	10,898	3.8	
PLS (PLANG)	14,650	1,050 (21,000)	15,700	4.4	
DPS (PRONG)	19,900	1,525 (30,490)	21,425	5.0	(Note 1)
DPS (AITTL)	4,900	663 (13,250)	5,563	3.0	
CSS (Common Facilities, DOF)	12,300	825 (16,500)	13,125	4.1	
CSS (Object Services)	15,000	2,000 (40,000)	17,000	4.6	(Note 1)
MSS (MACI, MLCI)	10,000	250 (5,000)	10,250	3.8	
MSS (MCI-Rel A Enhancement)	9,500	925 (18,500)	10,425	3.8	
MSS (MCI-Acc, Rep Gen)	14,800	0	14,800	4.3	(Note 1)
TOTALS	243,550		256,683		
Critical Design Duration 5 months					
Note 1. Line of code count in Revic is aggregate and doesn't reflect inherent parallelism					
Note 2. EDSI = Equivalent Delivered Source Instructions					
Information derived from REVIC model for Release B					

SLOC Comparison by Release

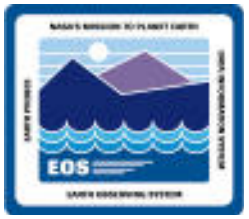
CI	PW1/EP4/IR1	Rel A @ CDR	Rel B @ IDR
Client Subsystem (CLS)	25,000	8,200	39,500
Interoperability Subsystem (IOS)	500	10,700	2,000
Data Management Subsystem (DMS)	0	12,000	30,400
Data Server Subsystem (DSS)	3,000	56,075	61,000
Ingest Subsystem (INS)	3,000	19,050	9,600
Planning Subsystem (PLS)	0	18,000	14,650
Data Processing Subsystem (DPS)	52,000	26,760	24,800
Communications Subsystem (CSS)	11,500	48,000	27,300
Management Subsystem (MSS)	5,500	23,500	34,300
Totals	100,500	222,285	243,550

The Incremental Track



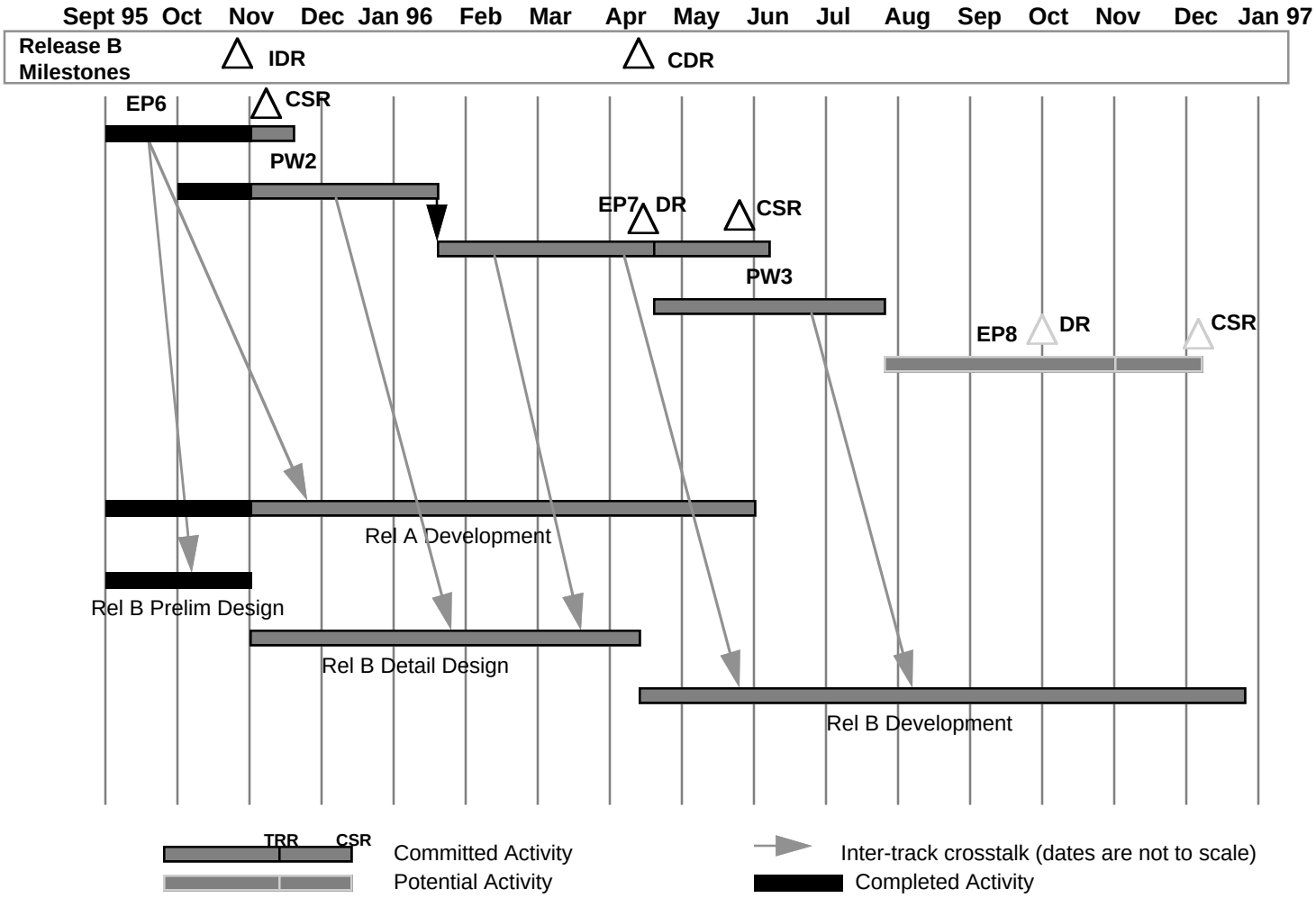
- **Functions are allocated to incremental development to resolve requirements uncertainty via early implementation**
- **Release B CIDM functionality is initially developed on the incremental track**
- **Incremental and formal track software are coded to the same standard**
- **As incremental track software transitions to formal track, its design documentation is upgraded to the formal track standard**
- **As-built formal documentation is delivered with the final product at CSR**

Incremental Track Flow

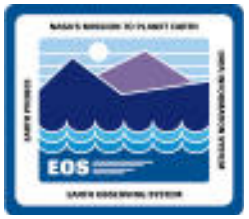


- Each Prototype Workshop (PW) ends with an in-house interactive user session
- Evaluation Packages (EPs) include deployable versions of PW prototypes plus upgrades
- EP development ends at the EP's TRR
- After TRR, code is processed through build/thread tests
- Each EP is delivered after its own CSR/ERR
- Feedback from EP tirekickers is used to plan future work

Formal / Incremental Coordinated Schedule



Release B Metrics: IDR Through CDR Identical to Release A



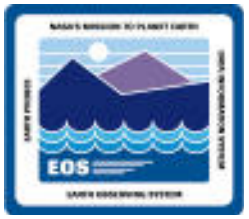
Early Warning Indicators

- Open Level 4 Requirements Issues—Work-off of open issues
- IDR RID Work-off status

Design Progress Indicators

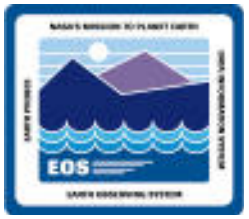
- Components Inspected—actual vs plan
- Internal & External Interface Classes Inspected—plan vs actual
- COTS Selections—actual vs plan
- Prototypes & Studies Completed—actual vs plan

Release B Metrics: CDR Through RRR Identical to Release A



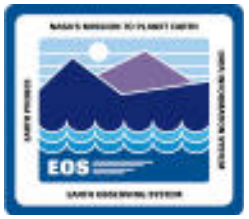
Code and Unit Test Progress Indicators	• Classes coded/unit test progress - actual vs plan
Test Progress Indicators	• Threads completed—actual vs plan • Builds completed—actual vs plan • I&T priority 1 & 2 NCRs (current period opened/ current period closed/total open) • IATO test cases executed—actual vs plan (post-CSR) • IATO priority 1 & 2 NCRs (current period opened/ current period closed/total open—post-CSR)

Cross-Release Coordination



- **Consolidation of Release A and Release B chief engineering teams into Development Engineering**
- **Infusion of technical and leadership staff: Irl ➡ B and A**
- **Coordination by leads at subsystem level**
- **Release A and B subsystem ‘Round Table’ discussions**
- **Design Issue Teams (DITs)—cross-release/cross-subsystem issue resolution**
- **SCDO/SO/SMO/M&O Steering Committee**

The Road to CDR—Summary



- **Sound detailed design objectives and approach**
- **Detailed design achievable by scheduled CDR**
- **Incremental track delivers important Release B functionality**
- **Release B metrics identical to Release A**
- **Continue successful cross-release coordination**